

The Legal Basis for the Role of SO₂ Modeling in

by **Cheri A. Budzynski**

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More than 30 years ago, stakeholders questioned the U.S. Environmental Protection Agency's (EPA) use of modeling for implementation of the National Ambient Air Quality Standards (NAAQS). EPA has again generated controversy over the use of modeling for implementation of the new sulfur dioxide (SO₂) NAAQS. This article outlines the legal basis for the use of modeling in attainment status designations, focusing on historical case law supporting its use and EPA's current unconventional approach to modeling the SO₂ NAAQS.



Historical and Current Attainment Status Designations

The U.S. Clean Air Act (CAA) requires EPA to promulgate NAAQS, which are the maximum concentration for certain pollutants that are necessary for the protection of “public health and welfare.”¹ EPA first promulgated NAAQS in 1971.² However, the CAA requires EPA to conduct a review of the NAAQS every five years, considering the most recent scientific data.³ There are NAAQS for carbon monoxide, lead, nitrogen dioxide, ozone, particulate matter, and SO₂.

After EPA promulgates or revises a NAAQS, a state is required to submit recommendations that designate areas within the state as nonattainment, attainment, or unclassifiable.⁴ EPA must then promulgate attainment status designations for each state, taking into consideration the states’ recommendations. Once EPA promulgates a NAAQS, each state must prepare a State Implementation Plan (SIP),⁵ subject to EPA’s approval.⁶ The SIP outlines the state’s plan for implementing, maintaining, and enforcing the NAAQS.⁷ If a state fails to submit an approvable SIP within the designated time, EPA can implement a Federal Implementation Plan.⁸

A History of the Use of Modeling to Determine Nonattainment Designations

The 1977 CAA required EPA to promulgate on a state-by-state basis attainment status designations for the SO₂ NAAQS.⁹ In determining the designations, EPA relied, in part, on modeling that projected violations of the SO₂ NAAQS. Several industries objected to this modeling and filed petitions for review in the United States Court of Appeals.

In *Republic Steel Corp. vs. Costle*, petitioners challenged EPA’s nonattainment designations in Ohio, arguing the use of models to predict violations was arbitrary and capricious.¹⁰

The Court dismissed this argument, noting that the CAA defined a “nonattainment area” as “an area which is shown by monitored data or which is calculated by air quality modeling ... to exceed any [NAAQS] for such pollutant.”¹¹ The Court concluded that “[w]here Congress has itself described two alternative methods for EPA to determine nonattainment, the decisions as to which to employ is certainly not ... one for this Court.”¹² Because the statutory language was explicit, EPA could rely on either monitoring or modeling data in designating an area nonattainment.

In *Republic Steel Corp.* petitioners also argued that EPA gave little weight to monitoring data that demonstrated attainment, arguing that these data were more accurate than modeling.¹³ While the Court agreed that monitoring data were superior to modeling data, the Court found there were insufficient monitors “to constitute a fair test of the ambient air in a county,” and the modeling was appropriate in identifying nonattainment areas.¹⁴

The Court even upheld the use of modeling despite EPA guidance indicating that where there was a conflict between adequate monitoring and modeling data, a state should use monitoring data.¹⁵ In *Cincinnati Gas & Elec. Co. vs. Costle*, the Court found EPA’s use of modeling was consistent with this policy. The Court noted that petitioners failed to demonstrate that the monitors in the county were “adequate.” Thus, the use of modeling was appropriate.¹⁶

The Seventh Circuit elaborated on this policy, noting, for monitoring to take precedent over modeling, a petitioner must demonstrate “the monitored data are adequate and the [monitoring] data conflicts with modeled results.”¹⁷ The Court found petitioners failed to satisfy these requirements, noting there was evidence that the monitors were inadequate

because the Wisconsin Department of Natural Resources' model demonstrated the monitors were not reflecting the air quality in the area. The Court also found "historical concentrations at discrete locations" do not conflict with future predictions of violations of the NAAQS.¹⁸ While monitoring data may be more accurate, EPA could rely on modeling to demonstrate nonattainment as a supplement to the lack of monitors.

Finally, where petitioners challenged the sufficiency of the model utilized, the Court deferred to EPA's technical judgment. In *Cleveland Electric Illuminating Co. vs. EPA*, industry challenged the Real-Time Air-Quality-Simulation Model (RAM), arguing that the model was too conservative. The Court noted it was not "the responsibility of [the] Court to determine whether the RAM model represents the best possible approach to determining standards ...", rather it was only the Court's responsibility to determine if the agency's action was arbitrary or capricious.¹⁹ The Court found the model may not have been the best method for implementing the CAA provisions, but petitioners failed to provide a

better method and EPA was not arbitrary and capricious for relying on the model.²⁰

EPA's Approach to Modeling in the 1-Hr SO₂ NAAQS

On December 8, 2009, EPA proposed revisions to the SO₂ NAAQS.²¹ EPA proposed to replace the 24-hr and annual standards with a short-term standard based on the 3-year average of the 99th percentile of the yearly distribution of 1-hr daily maximum SO₂.²² EPA proposed a maximum concentration between 50 to 100 parts per billion (ppb).²³ In its final rule, EPA adopted a 1-hr NAAQS for SO₂ of 75 ppb.²⁴ This started the 1-year clock for states to make recommendations for attainment status designations.

In the proposed rule, EPA indicated that designations would be based on existing SO₂ monitors. If the monitor indicated a violation of the 1-hr SO₂ NAAQS, that area would be designated non-attainment. However, where the monitor indicated no violation of the 1-hr SO₂ NAAQS, EPA would make a case-by-case determination of the area's status. EPA noted one possible outcome would be to designate the areas as unclassifiable because of a lack of a complete monitoring network.²⁵

In the final rule, EPA departed from its proposed methodology of relying on monitors. EPA adopted a "modified hybrid approach" to determine the attainment status, which included modeling.²⁶ EPA now asserted that monitoring was not the "most appropriate or effective tool" for determining compliance.²⁷ Under this hybrid approach, EPA indicated an area would "be designated 'non-attainment' if *either* available monitoring data or modeling shows that a violation exists, or 'attainment' if *both* available monitoring data and modeling indicate the area is attaining. All other areas would be designated 'unclassifiable.'"²⁸

In addition, EPA released implementation guidance on September 22, 2011. This guidance elaborated on EPA's requirement to base designations on modeling and monitoring. EPA outlined its framework for SIP

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implementation using modeling. States were to identify potential sources of SO₂ in nonattainment or unclassifiable areas and conduct refined air modeling to determine if the sources contribute to exceedances within the NAAQS.²⁹ While EPA and states have used modeling to determine if an area should be nonattainment, the use of modeling in unclassifiable areas is unprecedented.

The guidance indicates, for attainment and unclassifiable areas, states must submit by June 2013, Section 110(a)(1)-(2) SIPs, which will address the states' implementation and maintenance of the SO₂ NAAQS. For unclassifiable areas, EPA required states to "rely on refined modeling and any monitoring that demonstrates attainment and maintenance of the new SO₂ NAAQS ..."³⁰

EPA's approach of requiring modeling for unclassifiable areas received much criticism.³¹ Critics were concerned that the reliance on modeling would result in over-estimated emissions from potential sources. This over-estimation could result in strict emission limits that are unnecessary to protect the NAAQS.

On April 12, 2012, EPA backtracked on its proposed guidance. In letters issued to all states, EPA indicated that it would not require modeling for unclassifiable areas:

In light of the potential this process has to affect our recommendations for how to address the SO₂ NAAQS in areas initially designated "unclassifiable," we no longer expect your state's June 2013 SIP submittals to contain modeling demonstrations showing attainment of the standard in unclassifiable areas. . .³²

Instead, EPA conducted stakeholder outreach on May 30–June 1, 2012, with environmental and public health organization, state, and industry representatives to seek advice on how to revise its approach in determining whether an area meets the 1-hr SO₂ NAAQS. EPA also released a draft white paper to stimulate discussion with stakeholders.³³

In the white paper, EPA proposed "two conceptual approaches" for addressing unclassifiable areas lacking monitored data.³⁴ First, EPA proposed a



monitoring network. However, because there are insufficient monitors that are source-oriented, EPA proposed two approaches to expanding the monitor network: (1) a national network reallocation and expansion plan; and (2) a population-focused reallocation and expansion plan.³⁵ Under the national network plan, EPA proposed a major source SO₂ emissions threshold. Under the population focused plan, EPA proposed a “population-weighted emissions index ... based on population and emissions inventory data at the core-based statistical area ... level.”³⁶ Second, EPA proposed a modeling plan either to supplement a monitoring network or to be used in lieu of monitoring. Under

this plan, “states could model the sources that otherwise would have required one or more monitors under potentially revised minimum monitoring requirements.”³⁷ EPA is seeking comments on the feasibility of these two plans.

Conclusion

While EPA has stated that states do not need to model unclassifiable areas at this time, a hybrid approach of using monitoring and modeling is still under consideration. Based on the states’ resources, EPA’s unconventional approach to modeling could be implemented. **em**

References

1. 42 U.S.C. §7409(b).
2. 36 *Fed. Regist.* 8186 (Apr. 30, 1971).
3. 42 U.S.C. §7409(d).
4. A nonattainment area does “not meet (or ... contributes to ambient air quality in a nearby area that does not meet)” the NAAQS. An attainment area meets the NAAQS. An unclassifiable area is an area “that cannot be classified on the basis of available information as meeting or not meeting” the NAAQS. 42 U.S.C. §7407(d)(1)(A).
5. A state’s SIP is its roadmap for ensuring the state will achieve and maintain the NAAQS. The SIP must contain emission limits and control measures for sources of pollutants and, if necessary, compliance schedules to ensure that these sources meet the requirements of the SIP.¹ The SIP must also contain provisions that ensure adequate monitoring and enforcement measures.¹ Once EPA approves a state’s SIP, the provisions within the SIP become federal law. Thus, an approved SIP is enforceable by both the state and EPA.
6. 42 U.S.C. §7410(a)(1).
7. *Id.*
8. 42 U.S.C. §7410(c).
9. 43 *Fed. Regist.* 8962 (March 3, 1978).
10. *Republic Steel Corp. vs. Costle*, 621 F.2d 797, 799 (6th Cir. 1980).
11. *Id.* at 804 (emphasis added)(quoting 42 U.S.C. §7501(2) (1977); see, also, *Cincinnati Gas & Elec. Co. vs. Costle*, 632 F.2d 14, 18 (6th Cir. 1980); *Columbus & Southern Ohio Elec. Co. vs. Costle*, 638 F.2d 910, 912 (6th Cir. 1980). Congress has since revised this language and the statute is silent on monitoring data versus modeling data.
12. *Republic Steel Corp.*, 621 F.2d at 804.
13. *Id.*
14. *Id.*; see, also *PPG Industries, Inc. vs. Costle*, 630 F.2d 462, 464 (6th Cir. 1980) (finding that EPA need not rely on “actual, and not predicted, air quality” as the basis for attainment status designations; thus, the use of modeling that predicts future violations was not inappropriate).
15. *Cincinnati Gas & Elec. Co.*, 632 F.2d at 19; *Wisconsin Elec. Power Co. vs. Costle*, 715 F.2d 323, 330 (7th Cir. 1983).
16. *Cincinnati Gas & Elec. Co.*, 632 F.2d at 19.
17. *Wisconsin Elec. Power Co.* 715 F.2d at 330.
18. *Id.* at 331; *PPG Industries, Inc.*, 630 F.2d at 468 (“monitored data which merely show historical attainment of air-quality standards do not undermine the agency’s designations”); *Columbus & Southern Ohio Elec. Co.*, 638 F.2d at 912 (“Monitored data tending to show mere past attainment of air-quality standards ... do not per se show the unreliability of EPA’s predictions ...”); *Montana Sulphur & Chemical Company vs. EPA*, 666 F.3d 1174, 1185 (9th Cir. 2012), *petition for writ filed*, (“Monitoring can only measure pollutant concentrations as they occur; it cannot predict future concentrations when emission levels and meteorological conditions may differ from present conditions.”)(quoting 67 *Fed. Regist.* 22185 (May 2, 2002)).
19. *Cleveland Elec. Illuminating Co. vs. EPA*, 572 F.2d 1150 (6th Cir. 1978).
20. *Id.* at 1163. However, in instances where the modeling data were erroneous or a parameter of the model was suspect, the Court remanded the nonattainment designation for further agency consideration. *PPG Industries, Inc.*, 630 F.2d at 465 (remanded to EPA a designation where the modeling included erroneous data); *Columbus and Southern Ohio Elec. Co.*, 638 F.2d at 911-912 (remanded because use of a parameter in the model was suspect).
21. 74 *Fed. Regist.* 64810 (Dec. 8, 2009).
22. 75 *Fed. Regist.* 35520, 35523 (June 22, 2010).
23. *Id.*
24. 75 *Fed. Regist.* 35520.
25. 74 *Fed. Regist.* 64859.
26. 75 *Fed. Regist.* 35552.
27. *Id.*
28. *Id.* at 35553 (emphasis added).
29. EPA, Draft: Guidance for 1-Hour SO₂ NAAQS SIP Submissions (Sept 22, 2011).
30. *Id.* at 7.
31. Several states challenged EPA’s use of modeling in *National Environmental Development Association’s Clean Air Project vs. EPA*, No. 10-1252 et al. Oral arguments were held May 3, 2012.
32. Letter from G. McCarthy, Assistant Administrator of EPA, to S. Nally, Director of Ohio EPA, 2 (Apr. 12, 2010).
33. EPA, Draft: Implementation of the 2010 Primary 1-Hour SO₂ NAAQS, Draft White Paper for Discussion (n.d.); available online at <http://www.epa.gov/air/sulfurdioxide/pdfs/20120522whitepaper.pdf> (last visited June 6, 2012).
34. *Id.* at 6.
35. *Id.* at 7.
36. *Id.* at 8.
37. *Id.* at 10.

ACKNOWLEDGMENTS

A special thank you to Michael E. Born, Esq., Shumaker, Loop & Kendrick, LLP, and David Long, P.E., American Electric Power for their input on this article.

